

AMENDMENTS TO THE CLAIMS

Please amend the claims as shown below. The listing of the claims below replaces all prior versions of the claims.

Listing of the Claims:

1.17. (Canceled)

18. (Original) An electroporation apparatus for applying an electric pulse or electric pulses to a specimen including cells to thereby electroporate cell membranes and infuse foreign materials into the cells, comprising:

a long hollow specimen-stuffing member of non-conductive material; a reservoir connected to a distal end of the specimen-stuffing member for fluid communication; and a pressure maintaining means connected to the other distal end of the specimen-stuffing member for fluid communication.

19. (Currently Amended) The electroporation apparatus according to claim 18, wherein the specimen-stuffing member has a ratio (R , cm^{-1}) of a longitudinal length (L , cm) to horizontal cross-sectional area (A , cm^2) in the range of 50 to 10,000 ~~1/50 to 1/10,000~~.

20. (Currently Amended) The electroporation apparatus according to claim 18 ~~or 19~~, wherein the hollow specimen-stuffing member is a capillary, a tubing or a channel.

21. (Currently Amended) The electroporation apparatus according to claim 18 ~~or 19~~, wherein the pressure maintaining means is connected by a connector disposed with electrode insertion unit for inserting the electrode.

22. (Original) The electroporation apparatus according to claim 21, wherein the electrode is inserted into the electrode insertion unit for applying electric pulses, and the electrode contact the specimen if the specimen-stuffing member is filled therein with the specimen.

23. (Original) The electroporation apparatus according to claim 21, wherein the connector is a disc for forming a hole therein for passing the specimen, and the electrode insertion unit is formed at a lateral surface of the disc.

24. (Currently Amended) The electroporation apparatus according to claim 18 ~~or 19~~, wherein the pressure maintaining means is a pump, a syringe or a pipette.

25. (Original) An electroporation apparatus for applying an electric pulse or electric pulses to a specimen including cells to thereby electroporate cell membranes and infuse foreign materials into the cells, comprising:

a long hollow specimen-stuffing member of non-conductive material; a pressure maintaining means connected to a distal end of the specimen-stuffing member for fluid communication; a reservoir connected to the other distal end of the specimen-stuffing member for fluid communication and disposed with the electrode for contacting the specimen or an electrolytic solution; and a reservoir holder including a fixing unit for fixing the pressure maintaining means, an electrode terminal for electrically connecting the fixing unit and an electrode terminal for electrically connecting the electrode disposed at the reservoir.

26. (Original) The electroporation apparatus according to claim 25, wherein the pressure maintaining means is a pipette in which a conductive contact is disposed at part of the pipette body thereof and a movable electrode is inserted for communication with a piston, and wherein the hollow specimen-stuffing member is directly attached and detached to a tip mounting shaft of the pipette.

27. (Currently Amended) The electroporation apparatus according to claim 25 ~~or 26~~, wherein the hollow specimen-stuffing member is a capillary or a tubing.

28. (Currently Amended) The electroporation apparatus according to claim 25 ~~or 26~~, wherein the specimen-stuffing member has a ratio (R , cm^{-1}) of a longitudinal length (L , cm) to horizontal cross-sectional area (A , cm^2) in the range of 50 to 10,000.

29. (Original) An electroporation apparatus for applying an electric pulse or electric pulses to a specimen including cells to thereby electroporate cell membranes and infuse foreign materials into the cells, comprising:

a long hollow specimen-stuffing member of non-conductive material; and a pair of reservoirs connected to both distal ends of the specimen-stuffing member for fluid communication.

30. (Currently Amended) The electroporation apparatus according to claim 29, wherein the specimen-stuffing member has a ratio (R , cm^{-1}) of a longitudinal length (L , cm) to horizontal cross-sectional area (A , cm^2) in the range of 50 to 10,000 ~~1/50 to 1/10,000~~.

31. (Currently Amended) The electroporation apparatus according to claim 28 ~~or 29~~, wherein the hollow specimen-stuffing member is a capillary or a tubing.

32. (Original) An electroporation apparatus for applying an electric pulse or electric pulses to a specimen including cells to thereby electroporate cell membranes and infuse foreign materials into the cells, comprising:

a long hollow specimen-stuffing member of non-conductive material; and a pair of wells formed on the same substrate as that of the hollow specimen-stuffing member and so connected to both distal ends of the specimen-stuffing member for fluid communication.

33. (Currently Amended) The electroporation apparatus according to claim 32, wherein the specimen-stuffing member has a ratio (R , cm^{-1}) of a longitudinal length (L , cm) to horizontal cross-sectional area (A , cm^2) in the range of 50 to 10,000 ~~1/50 to 1/10,000~~.

34. (Currently Amended) The electroporation apparatus according to claim 32 ~~or 33~~, wherein the hollow specimen-stuffing member is comprised of a micro channel.

35. (Currently Amended) The electroporation apparatus according to claim 32 ~~or 33~~, wherein more than two channels of the hollow specimen-stuffing members are connected to a pair of wells for fluid communication.

36. (Original) The electroporation apparatus according to claim 35, wherein each channel length of the channels is different.

37. (Original) The electroporation apparatus according to claim 35, wherein each width of the channels is different.

38. (Original) The electroporation apparatus according to claim 35 further comprising an upper substrate and a lower substrate, wherein the upper substrate is formed with a hole in which a well is formed, and the upper substrate or the lower substrate is formed with the channels which are depressed.

39. (Original) An electroporation method for applying an electric pulse or electric pulses to a specimen including cells to electroporate cell membranes and infuse foreign materials into the cells, wherein a long and hollow specimen-stuffing member of non-conductive material is filled with the specimen and an electric pulse or electric pulses are applied to both distal ends so that a current can flow through the specimen.

40. (Currently Amended) The method according to claim 39, wherein the hollow specimen-stuffing member has a ratio (R , cm^{-1}) of a longitudinal length (L , cm) to horizontal cross-sectional area (A , cm^2) in the range of 50 to 10,000 ~~1/50 to 1/10,000~~.

41. (Currently Amended) The method according to claim 39 ~~or 40~~, wherein the hollow specimen-stuffing member is a capillary, a tubing or a channel.

42. (Currently Amended) The method according to claim 39 ~~or 40~~, wherein the electroporation in the specimen-stuffing member is continuously conducted.

43. (New) An electroporation system for introducing foreign materials into cells by electroporating cell membranes by way of applying an electric pulse or electric pulses to a specimen including the cells, comprising:

the electroporation apparatus according to claim 18; and

a pulse generator for generating an electric pulse,

the reservoir is disposed with an electrode contacting the specimen or an electrolytic solution, the specimen-stuffing member is filled with the specimen by the pressure maintaining means, the specimen or the electrolytic solution filled in the reservoir is connected to a distal end of the specimen-stuffing member for fluid communication, and an electric pulse or electric pulses are applied to an electrode contacting the specimen or the electrolytic solution filled in the reservoir and the other electrode inserted into the electrode insertion unit of the connector to thereby electroporate the cells in the specimen filled in the specimen-stuffing member.

44. (New) The electroporation apparatus according to claim 26, wherein the movable electrode is a plastic of which surface is coated with conductive material.

45. (New) An electroporation system for introducing foreign materials into cells by eletroporating cell membranes by way of applying an electric pulse or electric pulses to a specimen including the cells, comprising:

the electroporation apparatus according to claim 25; and

a pulse generator for generating an electric pulse,

wherein the pressure maintaining means is a pipette disposed at part of the body thereof with a conductive contact, and a movable electrode disposed inside the specimen-stuffing member is inserted for communication with a piston, and

wherein the hollow specimen-stuffing member is directly detached and attached to a tip mounted shaft of the pipette, the movable electrode is raised or lowered to a distal end of the specimen-stuffing member by a depression button of the pipette to fill the specimen in the specimen-stuffing member or retrieve it, the pipette is inserted and fixed to a reservoir holder inner pipe, a contact of the pipette body is electrically connected to the electrode terminal via the fixing unit of the reservoir holder inner pipe, the specimen-stuffing member is so positioned as to fluidly communicate with the specimen or the electrolytic solution stored in the reservoir, and an electric pulse or electric pulses are applied to the electrode contacting the specimen or the electrolytic solution stored in the reservoir to thereby electroporate the cells in the specimen filled in the specimen-stuffing member.

46. (New) An electroporation system for introducing foreign materials into cells by eletroporating cell membranes by way of applying an electric pulse or electric pulses to a specimen including the cells, comprising:

the electroporation apparatus according to claim 29; and

a pulse generator for generating an electric pulse,

the reservoirs are disposed with electrodes for contacting the specimen or an electrolytic solution and an electric pulse or electric pulses are applied to the electrodes contacting the specimen or the electrolytic solution stored in the reservoirs, thereby electroporating the cells in the specimen filled in the specimen-stuffing member.

47. (New) An electroporation system for introducing foreign materials into cells by eletroporating cell membranes by way of applying an electric pulse or electric pulses to a specimen including the cells, comprising:

the electroporation apparatus according to claim 32;

a pulse generator for generating an electric pulse; and

electrodes for applying an electric pulse or electric pulses to the specimen by the pulse generator, and

wherein the electrodes are inserted in the wells through which the electric pulses are applied to thereby electroporate the cells in the specimen-stuffing member.